REMARKS

After entry of the foregoing amendment, claims 6 and 20-51 are pending in the application.

Claims 34-51 are newly added, and are copied from parent application 09/629,649, which applicants presently intend to let go abandoned. (Claim 36 has been modified slightly from its counterpart in the parent: claim 8.) Claims 7-11, and 19, are canceled as essentially duplicative of claims copied from the parent application (over which a provisional double-patenting rejection was earlier made).

The Examiner in the parent application, Edward Cosimano, issued an Action on October 7, 2005, in which he allowed claims 19 and 24, and objected-to claims 21 and 22 (for depending from a rejected claim), as numbered in the parent. These claims have been copied into the present application as claims 46 and 50 (for the allowed claims) and claims 48-49 (for the objected-to claims). Claim 48 has been rewritten into independent form, and claim 49 depends from it. Accordingly, the Examiner is requested to favorably consider allowing these claims 46, 48, 49 and 50.

The other copied claims stand rejected in the parent application. The Examiner is referred to the October 7, 2005, Action in that case for details. A copy of that Action is submitted as Exhibit D.

Claims 11 and 20-33 are rejected under the written description requirement.

"Texturing," as recited in former claim 11 (and now recited in claim 38), finds support, e.g., at page 3, line 20; page 4, line 4; page 7, line 18; and in claim 11 as originally filed. Further support is found in the patents and patent applications incorporated-by-reference into the present specification (*see, e.g.*, page 1, lines 4-14; page 4, lines 12-13; page 7, lines 1-2; and page 11, lines 7-9). For example, patent 6,345,104 teaches:

> *In an illustrative embodiment, the printing of the security document is achieved by intaglio printing. Intaglio is a well known printing process employing a metal plate into which the security document pattern is etched or engraved. Ink is applied to the plate, filling the etched recesses/grooves. Paper is then pressed into the plate at a very high pressure (e.g. 10-20 tons), both raised-inking and slightly deforming (texturing) the paper.*

Although ink is commonly used in the intaglio process, it need not be in certain embodiments of the present invention. Instead, the paper texturing provided by the intaglio pressing--alone--can suffice to convey watermark data. (Texturing of a medium to convey watermark information is disclosed in various of my prior applications, including allowed application 08/438,159.)

To illustrate, an intaglio plate was engraved (using a numerically controlled engraving apparatus), to a depth of slightly less than 1 mm, in accordance with a 3.2.times.3.2 cm. noise-like block of watermark data. The watermark data was generated as described above (e.g. 128 bits of data, randomly distributed in a 128.times.128 cell array), and summed with a correspondingly-sized block of calibration data (implemented as discrete grey-scaled cells, rather than the line/weave pattern detailed above). In this embodiment, the data was not kept within a small range of digital numbers, but instead was railed to a full 8-bit dynamic range.)

This textured paper was placed--textured extrema down--on the platen of an conventional flatbed scanner (of the sort commonly sold as an accessory for personal computers), and scanned. The resulting image data was input to Adobe's Photoshop image processing software, version 4.0, which includes Digimarc watermark reader software. The software readily detected the watermark from the textured paper, even when the paper was skewed on the scanner platen.

The optical detection process by which a seemingly blank piece of paper can reliably convey 128 bits of data through an inexpensive scanner has not been analyzed in detail; the degree of localized reflection from the paper may be a function of whether the illuminated region is concave or convex in shape. Regardless of the explanation, it is a remarkable phenomenon to witness.

The watermark and the franking mark being printed by the same printer (claims 20-22) finds support, *e.g.*, at page 2, lines 1-2; and page 5, lines 16-19. The resolution being 1200 dpi or less finds support, *e.g.*, in application 09/503,881 (now patent 6,614,914), which refers to watermarked imagery being printed at a resolution of, e.g., 100 to 300 dpi (col. 22, line 31):

As described above, the embedder typically operates on a digital image in a particular color space and at a desired resolution. The watermark embedders normally operate on digital images represented in an RGB or CYMK color space at a desired resolution (e.g., 100 dpi or 300 dpi, the resolution at which the image is printed).

Regarding claim 23, support is found, e.g., in incorporated-by-reference patent 6,345,104, which teaches watermark-encoding of postal stamps, and notes:

In most watermarking techniques, the luminance or color values of component pixels are

slightly changed to effect subliminal encoding of binary data through the image.

That patent goes on to note:

To retrofit existing security document designs with information patterns, the existing artwork must be modified to effect the necessary additions and/or tweaks to localized security document luminance and/or texture.

Claim 24 is supported as claim 11, above.

Re claim 25, support is found, *e.g.,* in incorporated-by-reference patent 6,614,914, which notes:

Digital watermarking technology allows the user to embed digital messages within media content. These digital messages are imperceptible to humans but can be read by computers and specialized devices.

Re claim 26, the randomization of the digital data into a pattern finds support, *e.g.,* by the teachings of spread spectrum modulation of a payload through an image in incorporated-by-reference patent 6,614,914, which notes:

The process of embedding a digital watermark into an image using Digimarc's watermarking technology can be summarized as follows. First, the image is divided into blocks of N.times.M pixels. Then the watermark is independently embedded in each of these blocks. This allows the watermark to be detected from an image region as small as N.times.M pixels. Spread spectrum techniques are used to make the signal imperceptible and to combat the effect of image manipulation and filtering. Let w.sub.0 (n)={w.sub.0.sub..sub.1 ,w.sub.0.sub..sub.2 , K, w.sub.0.sub..sub.i-1 ,w.sub.0.sub..sub.1 } be the watermark signal to be embedded in the image, where w.sub.0.sub..sub.1 ={-1,1}. The amount of information to be embedded determines the length of the vector w.sub.0 (n). This amount of information should not exceed the channel capacity represented by the original image. Error correction techniques such as Bose-Chaudhuri-Hocquenghem (BCH) or Convolutional Codes are first applied to W.sub.0 (n) in order to produce a robust signal, w.sub.ep (n)={w.sub.ep.sub..sub.1 , w.sub.ep.sub..sub.2 ,K, w.sub.ep.sub..sub.L-1 ,w.sub.ep.sub..sub.L }, where L>I. Also, let K.sub.i (n)={k.sub.i.sub..sub.1 ,k.sub.i.sub..sub.2 ,K ,k.sub.i.sub..sub.j+1 , k.sub.i.sub..sub.j } be a set of L pseudo-random binary keys, where k.sub.i.sub..sub.j ={-1,1} and J.times.L=N.times.M. Each of these keys is associated with one of the bits in the error-protected watermark, W.sub.ep (n). These random keys are first used to spread each of the bits of the watermark signal, w.sub.ep (n), to produce C.sub.i (n), which is a vector of

length J.

C.sub.i (n)=w.sub.ep.sub..sub.1 .times.K.sub.i (n) (1)

Also, let I.sub.i (m,n) be an N.times.M matrix that maps each of the bits of C.sub.i (n) to a particular location in the N.times.M space. The locations of all the bits that belong to C.sub.i (n) are marked as 1's in the N.times.M binary mask M.sub.i (m,n) and everything else is marked as 0. Also, each mask is orthogonal to all the masks associated with the other bits; i.e, ##EQU1##

matrix of 1's. Hence, each bit of w.sub.ep (i) can be scattered in the N.times.M block as follows

S.sub.i (m,n)=M.sub.i (m,n)C.sub.i (l.sub.i (m,n)) (2)

The above process is similar to data interleaving in spread spectrum communications, which is used to combat burst error. Finally, the sum of the scattered bits is added to the image, P(m,n), to produce the watermarked image, P.sub.w (m,n). ##EQU2##

where .alpha..sub.m,n is a gain coefficient that is calculated based on the image properties around location (m,n) in the block.

Re claim 27, support is found, e.g., by the discussion of tinting at page 4, lines 4, lines 3-9:

Several different watermarking technologies can be employed on a single envelope, e.g., the envelope's texture can convey one type of information, and tinting printed on the envelope can convey a second type of information. Moreover, both the front and back of the envelope can be encoded – either with the same watermark information or different. Still further, the inside of the envelope or mail piece (e.g., catalog) can likewise be encoded. The watermark may be formed in an otherwise blank area, or can be integrated into other graphics, such as advertising artwork, corporate logos, etc.

Tinting as a background pattern is further discussed in other of the incorporated-by-reference documents, such as patent 6,345,104, which teaches:

In a variant of the speckling technique, very thin mesh lines can be inserted in the artwork--again to slightly change the luminance of one or more regions (so-called

"background tinting").

Claim 28 is supported as claim 22, above.

Claim 29 is supported as claim 23, above.

Claim 30 is supported as claim 11, above.

Claim 31 is supported as claim 25, above.

Claim 32 is supported as claim 26, above.

Claim 33 is supported as claim 27, above.

The provisional rejections over application 09/567,405 will be mooted by the abandonment of that application.

Claim 6 stands rejected as anticipated by Leon.

In comments on applicants' earlier arguments, the Office asserts that Leon teaches a watermark comprising a machine readable pattern – citing in support 24 lines from Leon's column 7 and 8.[1] It will be recognized that this cited passage discloses a variety of features. Included are various "machine readable features." However, claim 6 requires a "fragile digital watermark representing plural bits of digital data." Where, particularly, does Leon teach a fragile digital watermark?

Does the Office regard Leon's "micro printing" as a fragile digital watermark? Or is in the invisible ink printing? Or is it the microscopic taggant identification beads that may be mixed into Leon's ink? Or it is something else?

What "plural bits of digital data" does the asserted feature in Leon represent?

The Office is reminded that Leon teaches that his label comprises three elements: (1) a human-readable portion; (2) a machine-readable portion; and (3) an identifier portion.[2] He does not teach that the "identifier portion" is "machine-readable." Rather, the "identifier portion" and "machine readable" portions are described as having different attributes and different functions.

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1 July 26, 2005 Action, page 2, lines 3-5.

2 *See, e.g.*, Leon abstract, 3d sentence. *See also* col. 2, lines 51-53.

Leon describes his micro-printing, his special inks, and his taggants, all as being suitable for use as the "identifier portion." He describes none of them as machine-readable.

Applicants respectfully submit that while Leon teaches machine readable features, he does not teach such a fragile digital watermark, as claimed.

Claims 20-25 (each of which depends directly or indirectly from claim 6) also stand rejected as anticipated by Leon.

Leon admittedly teaches that printer 154 can print various indicia, and has a resolution of 200 dots per inch. However, it will be recognized that a 200 dpi printer cannot print the "micro printing" that Leon teaches (if, in fact, this is what the Office regards as a fragile digital watermark).

Regarding claim 23, the Office cites 27 lines from column 9 as teaching a watermark comprised of features of another indicia on the envelope, which are subtly changed to alter the local luminance or color thereof. However, this passage is not understood to teach the claim limitation. The cited passage reads:

> *Elements in the indicia can be printed using various types of ink including visible and invisible inks, fluorescent and non-fluorescent inks, or any combination thereof. The ink used for some or all elements can be visible to the human eye. The ink can also be invisible to the human eye under white light (or daylight) and become apparent only under light of specified wavelength(s) such as UV light. For example, ink can be used that renders the printed materials invisible under normal light, but would fluoresce blue under certain non-visible forms of light for instance, UV light. Detection devices can be used to detect the existence and contents of the printed materials, i.e., to authenticate the indicia.*
>
> *The special ink can be manifested on the indicium label in various ways. For example, parts of the preprinted information on the label can be printed with ink that is visible under normal light. These parts would fluoresce, for example, under UV light. Fluorescent and non-fluorescent inks can have identical appearance under normal lighting and can be used in combination to produce patterns that alter radically when viewed under UV light. As another example, the fluorescent and non-fluorescent inks can be non-pigmented, making them nearly invisible under normal light. Under UV light, the materials printed with these inks can glow and stand out, again radically changing the appearance of the label. Under normal lighting conditions, the imprints can be viewed in similar ways as watermarks, but are typically not conspicuous.*

Nothing here teaches forming the claimed fragile digital watermark by subtly changing local luminance or color of features of another indicia on the envelope.

The Office also cites column 9 of Leon as teaching claim 24's requirement that the watermark comprises a texture pattern on the envelope formed by deformation of a substrate material. The cited passage from column 9 reads:

> *In an embodiment, taggants can be added to the ink to provide enhanced security. Taggants are microscopic identifiers (or beads) that can be mixed into the ink (e.g., fluorescent, conventional, or other types of ink), and are not easily detected. Taggants can be included in the ink used by the printer that prints indicia, such as the built-in printer within the metering device, or the ink used to print the preprinted label, or both. Taggants can also be added to the adhesive (i.e., glue) and/or the paper used for the indicium label. Generally, taggants can be added to any and all parts of the indicium.*

Again, it will be recognized that nothing here teaches deforming a substrate material to form a texture pattern of which the watermark is comprised.

In rejecting claim 25, the Office asserts that the claim requirement (*i.e.*, that the plural bits of digital data represented by the watermark cannot be discerned by human inspection, even with magnification) is met by Leon's discussion at col. 10, lines 60-64 regarding printing with invisible ink. Is Leon's invisible ink marking what is regarded as a "fragile digital watermark representing plural bits of digital data"? Again, it will be recognized that Leon does not teach use of such ink as part of his "machine-readable" portion.

In view of the foregoing, the Office is respectfully requested to withdraw the § 102 rejections of claim 6 and 20-25 over Leon.

Claims 6 and 20-25 are also rejected over Adler (6,275,599) in view of Leon. The same claims are also rejected over Coppersmith (6,256,736) in view of Leon.

The Examiner is reminded of Office policy that only the best rejection should be presented; multiple rejections premised on different combinations of art are not viewed favorably by the Board. If claims are to be rejected, the Examiner is requested to reject them under § 102 (Leon), or § 103 (Adler+Leon), or § 103 (Coppersmith+Leon), but not two or more of them.

The § 103 rejections, in which Leon must be combined with other art to meet the claims' limitations, appears as an admission that Leon, alone, does not teach all of the claims' various limitations.

To the merits of the first § 103 rejection, applicants note that Leon is again cited as teaching a fragile digital watermark representing plural bits of digital data.[3] Again, as explained above, Leon does not so teach. Accordingly, the rejection is based on an error of fact, and *prima facie* obviousness is therefore not established.

Moreover, it will be recognized that Adler concerns watermarking of digital imagery in compressed form.[4] Leon does not concern digital imagery, nor does it relate to compression. Applying any teachings from Adler to the print realm of Leon, and to paper envelope substrates, is a leap guided by impermissible hindsight, not a suggestion in the art.

To rationalize the combination, the Action asserts only:

> *Adler and Leon are combinable because they are both directed to techniques for protecting the security of digital representations using watermark technology. At the time of the invention, it would have been obvious to one of ordinary skill in the art to combine Adler with Leon to obtain the invention as specified in the claims.*

First, it will be recognized that the second sentence does not offer any rationale – just a conclusion. No reason therefor is offered.

The former sentence is factually incorrect. Leon is not directed to a technique for protecting the security of any digital representation – let alone using watermark technology.

Finally, it will be recognized that applicants' original fragile watermark, formed on the claimed envelope, conveys plural bits of digital data. Only when scanned and printed (as by photocopying) does the watermark not survive. In contrast, Adler's fragile watermark is in the *digital* realm. Since printing – even of the *original* – results in imperfect bit-for-bit reproduction of Adler's original watermarked digital image, then an original envelope (or other printed

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3 July 26, 2005 Action, page 11, lines 5-6.

4 Adler, col. 1, lines 8-10.

document) that includes Adler's fragile watermark, will not convey plural bits of digital data. The mere act of printing the "original" will corrupt his watermark, and frustrate any ability to recover the intended plural bits of digital data therefrom. Thus, Adler's technology – if employed in Leon's application – would not convey plural bits of digital data; they would be lost by the very act of printing the original.

(Similar, and additional, shortcomings apply to the § 103 rejections over Coppersmith+Leon, and Gasper+Leon. However, applicants do not belabor this response further, by addressing rejections made in contravention of Office policy.)

The § 103 rejections fall short of the Office's burden, and withdrawal is therefore requested.

Claims 7 and 28-31 stand rejected over Zhao (6,754,822) in view of Leon. Again, the rejection is believed to be one that the Board will not sustain. For example, it is premised on factual errors (*e.g.*, the Action states that Leon is directed to techniques for protecting the security of digital representations, when it is not). And the rationale for combining Zhao and Leon again comprises two sentences, the latter of which is a conclusion without a reason, and the former of which is factually incorrect, as noted above.[5]

Regarding claim 30, it will be recognized that – contrary to the assertion in the Action – Leon has no teaching of a texture pattern on an envelope formed by deformation of a substrate material.

In the interest of concluding this prolonged prosecution, the Examiner is authorized to cancel claims 7 and 28-31 by Examiner's amendment, if he finds that the application is otherwise in condition for allowance. (Applicants would then intend to pursue such claims in a related application.)

Claims 32 and 33 stand rejected over Zhao + Leon + Haitsma (6,865,589).

Again, Haitsma concerns watermarks of *digital* images. No watermark that survives to print is taught. His technology thus suffers like Adler's, above.

[5] July 26, 2005, Action, page 14, lines 10-14.

As to claim 33, the language requires that the background pattern of which the watermark is comprised "forms no part of any other marking on the envelope." The cited passage from Zhao, in contrast, teaches that his watermark is embedded in a "background image." This "background image" is present even without the watermark – see the reference to the prior art ("at present..."), and its "background image," noted at Zhao, col. 10, line 54. Thus, the watermark taught by Zhao forms part of another marking, i.e. this other image. Accordingly, Zhao teaches *away* from the arrangement of claim 33.

Claims 8-11 have been canceled, but subject matter of claims 8, 9 and 11 is carried forward in new claims 36-38.

Regarding these claims, the Office has taken an untenable view of the meaning of the term "steganographic" (as meaning simply printed/recorded). This term is well understood by artisans in the field. Books have been written on the topic.[6] A bar code – such as is taught by Gilham – is not a steganographically encoded digital watermark. It is a classic example of what such a watermark *is not*. The Board will not sustain a rejection in which the plain meaning of a claim term is disregarded, as has been done in this rejection.

Submitted herewith as Exhibit C is a Declaration prepared by Dr. Adnan Alattar, and submitted in the parent application, concerning the Gilham art applied against claim 8, and the meaning of the term steganographic.

Applicants have already addressed claims that – in contravention of Office policy – have been rejected on other, cumulative grounds. Again, applicants do not belabor this response by addressing such cumulative rejections. (Exhibit B hereto is a page summarizing the rejections in the last Action. Although there were 22 claims, there were not 22 rejections. There were 44. One claim, 6, was rejected four different ways. Many claims were rejected three ways.)

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[6] *See, e.g.,* the following books – details for which (from Amazon.com) are attached as Exhibit A:
Katzenbeisser, *Information Hiding Techniques for Steganography and Digital Watermarking;*
Wayner, *Disappearing Cryptography, Second Edition - Information Hiding: Steganography and Watermarking;*
Cole, *Hiding in Plain Sight : Steganography and the Art of Covert Communication.*

In the next Action, the Examiner is requested to reject any rejected claims by presenting what is believed to be the best rejection, and to avoid rejecting claims on multiple bases.

Respectfully submitted,

Date: October 26, 2005

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Clm	Rejection #1	Rejection #2	Rejection #3	Rejection #4
6	§102 Leon	§103 Adler+Leon	§ 103 Coppersmith+Leon	§ 103 Turho+Tonges
7	§ 103 Zhao+Leon	§ 103 Gasper+Leon		
8	§ 103 Gilham+McDonough	§ 103 Lee + Leon		
9	§ 103 Gilham+McDonough	§ 103 Lee + Leon		
10	§ 103 Gilham+McDonough	§ 103 Lee + Leon		
11	§ 103 Gilham+McDonough	§ 103 Lee + Leon		
19	§102 Leon			
20	§103 Adler+Leon	§ 103 Coppersmith+Leon		
21	§102 Leon	§103 Adler+Leon	§ 103 Coppersmith+Leon	
22	§102 Leon	§103 Adler+Leon	§ 103 Coppersmith+Leon	
23	§102 Leon	§103 Adler+Leon	§ 103 Coppersmith+Leon	
24	§102 Leon	§103 Adler+Leon	§ 103 Coppersmith+Leon	
25	§102 Leon	§103 Adler+Leon	§ 103 Coppersmith+Leon	
26	§103 Adler+Leon			
27	§ 103 Adler+Leon			
28	§ 103 Zhao+Leon	§ 103 Gasper+Leon		
29	§ 103 Zhao+Leon	§ 103 Gasper+Leon		
30	§ 103 Zhao+Leon	§ 103 Gasper+Leon		
31	§ 103 Zhao+Leon	§ 103 Gasper+Leon		
32	§ 103 Zhao+Leon+Haitsma			
33	§ 103 Zhao+Leon+Haitsma			

Table summarizing rejections in July 26, 2005 Action.

EXHIBIT B